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Rose Thorn Staff
Rose-Hulman Institute of Technology, library@rose-hulman.edu

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THE TECHNIC.

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THE class of 1905, believing in taking time by the forelock, have elected the board of editors for their *Modulus*, which is to be printed in June, 1904. The board has gone to work immediately, as will be attested by the fact that they have already given a Glee Club concert and are arranging a series of dances, in order to obtain that all-important financial footing. The board elected consists of: Fred B. Lewis, Editor-in-Chief; Herbert Shryer, Assistant Editor; Leon Goodman, Business Manager. With such a capable board, there can be no doubt that the 1905 *Modulus* will prove a great success in every way.

ANOTHER foot-ball season is over, and again we have to look back on a rather sad record. It would be hard to tell wherein lies the cause of our lack of success. One thing, however, is sure; the manager is not to blame. Mr. Jacob worked hard and prepared as good a schedule as we have ever had. He was on hand whenever needed, and he deserves the thanks of the school for the care and time he spent on this work. Professor Hathaway, as usual, did his share of working for the team; this is of course greatly appreciated. Credit should also be given to Captain Brannon and to those members of the team who were out and willing to practice every night. These men were few, however, and doubtless to this fact may be ascribed the principal cause of our lack of success. Some would come out one or two evenings of the week, while others would perhaps practice for and play one game. This, of course, had a demoralizing effect on the team. We regret very much to see such a lack of "sticktoitiveness" exhibited by Rose men.

IN closing the foot-ball news for the year thanks are due to Mr. Crawford, and to Messrs. Gilbert and Fitzpatrick for reporting some of the games. Mr. Crawford has reported most of the games played by the first team away from home, and Mr. Gilbert and Mr. Fitzpatrick those of the second team.

THE Alumni article that we had expected to present this month did not put in its appearance; so, at the last moment, we had to seek another source. The Institute kindly gave us permission to make some extracts from the Thesis presented, last June, by Mr. Frank A. Whitten, '98, for the degree of Master of Science. We regret that there was not sufficient time to have reproduced the many excellent drawings, so that the entire Thesis could have been published.

BASKET-BALL is now to be taken up, and it is to be hoped, with more success than we have had in foot-ball. Manager Reynolds has already scheduled four games, and practice has begun. As the members of last year's team are in school, the team will be, at least, as strong as last year. Two of the games scheduled are with Purdue, and two with Wabash.

THURSDAY next is Christmas day and all the world will break forth in a chorus of singing, "Christ is born in Bethlehem;" the bells will echo it, and the sun on a million gilded spires will proclaim His birth.

INDICATIONS of the approaching holiday season are to be seen on every hand. Shop windows are aglow with richly colored toys; children's faces are cheering up with sunlight smiles; the fathers' hands are diving into the depth of their pockets, and the mothers and sisters are getting ready the Christmas stockings for the dainty gifts of the always welcome Santa Claus, and the Christmas tree, the green of which reflects the life-pulse of youth and pleasure.

LET us give a joyous greeting to the merry Christmas holidays, and, as we remember those that are near and dear, let us not forget the poor, who are made thrice happy by the cheerful faces of those around them, and in the thought that there is in humanity a link that binds all in one bond of happiness—sweet charity.

AT its close let us bury with the old year every angry thought and unkind feeling we may harbor toward any of our fellow creatures, and if the world has dealt unfriendly with any of us, let that too be buried with other unpleasant memories of the year, while we cherish only the happy scenes and flowing memories of this year, whose requiem will be sung out with the closing day.

THROUGH an oversight Prof. John B. Peddle's name did not appear in connection with his article on Sail Boats, that was published in our last number. We regret that we were guilty of such a sin of omission, and hasten to make restitution.

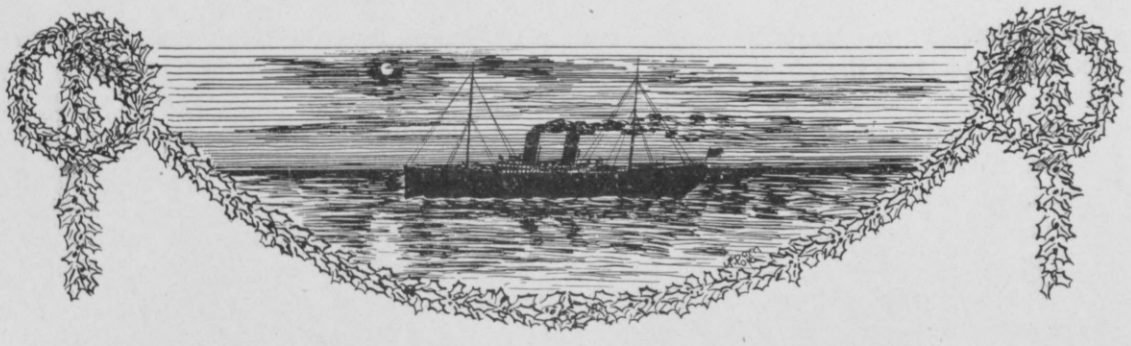
DR. NOYES has organized a bible-class, strictly for Polytechnic students, at the Congregational Church. We all know Dr. Noyes to be a deep student, a fine lecturer upon scientific subjects, and thorough in everything that he undertakes. It is, therefore, easy to draw the conclusion that he makes the study of the Scriptures both interesting and instructive.

The class now consists of about twelve members, and as it was at the instance of the Rose Tech Y. M. C. A. that Dr. Noyes organized the class, the Association is particularly anxious that the attendance be greatly increased.

WE have heard several remarks made lately as to the lack of care which our emblems of past glory in athletics receive. According to present indications it looks as though some time would elapse before Rose wins another interstate championship banner. Ought we not, therefore, take good care of those which our past victors worked hard to obtain. If we cannot have a case to show them off in, we believe that they might at least be kept in a safe place.

IN this number we have strayed somewhat from the usual path of a scientific paper. In fact, we present but one scientific article—the Alumni. It should be remembered that THE TECHNIC has its functions as a college paper as well as its others. We have, therefore, followed precedent and endeavored to make the Christmas number more of a college magazine.

WE are greatly indebted to Mr. Dorn, '04, for the heading of the Leading Article, and the various tail-pieces used in this issue.



That Tight Little Isle.

BY AUSTIN M. PATTERSON.

IF we were to define the rights and privileges of a traveler in a foreign country as regulated by usage, I suppose they would run somewhat as follows: After two days he may publish a small volume of "Impressions;" at the end of two weeks a series of illustrated lectures is allowable; a month's residence should be celebrated with an exhaustive treatise on the "life, language and customs"—except that in the case of the United States the Customs come first and the language comes afterward.

Accordingly, having lived in Great Britain for the extended period of six weeks, the writer is no doubt peculiarly qualified to discuss the British nation in general. Unfortunately he has left his guide book behind, and his readers must sorely miss the exhilarating details which it would have afforded. Let me prevent disappointment at the start. This article does not state the dimensions of the Cathedral of Ely or the number of steps to the top of St. Paul's. It is merely an answer, for the most part, to that most frequent question, "How did you do when you," etc.

The English money was, of course, one of our first acquaintances. On the way over I obtained an outfit of coins from the purser—which gentleman, by the way, increases his living by selling at $5 and buying at $4.80. Several pieces correspond in size and appearance to American coins of the same value—the sixpence (twelve cents) to the dime, the shilling (24 cents) to the quarter, and the florin (2s.) to our half-dollar. The half-crown is worth about sixty cents, and the slightness of difference between it and the florin is the only confusing thing in the system.

In place of the two- and five-dollar bills there are the gold half-sovereigns and sovereigns, which are usually carried apart from the silver in little leather cases. The Bank of England notes are for five pounds and upwards, and the cases in which I carried those were extremely rare. On landing in Liverpool I made a good beginning by paying a cabman three times as much as he deserved for taking us to the hotel. But that was because, having read up on the subject, I thought I knew a thing or two about the cab rules. In the light of his beaming face I read my mistake. It never happened again, and it would have been reasonable enough in New York, anyway.

You can't go very far without travelling on the railways, and that provokes comparisons of the American and English roads. About all that I already knew of the latter was that they had classes and compartments, and that the engineers were called "drivers" and the brakemen "guards." And I was quite sure that the system as a whole was far inferior to our own.

That conviction was strengthened by a visit to the nearest station. What dinky little cars and engines! And that "goods" train over there—why, it would take four of those little carts to make a modern American freight car. And they actually have oil-cloth covers over them as their only protection from the rain. (It was raining

then, of course. It usually is.) So ran my thoughts, and I pictured the surprise on the faces of the crowd if "Number Two" could come thundering into that shed.

However, respect for the English railway grows with acquaintance, until finally the point is reached where you are willing to admit that American roads might take a few hints. But I am forgetting the "how do you do?" question. Well, you "do" somewhat in this fashion: You first go to the "booking office." If you wish white linen head-rests and lonesomeness you will go to the "first-class" window. Second-class differs only a little from first in prices and upholstery, and is being abolished on many of the roads. The third-class you will find quite the equal of our own day coaches, with plenty of genteel company. One Englishman told me that only Americans and fools ride first-class, while another's version of it was, Americans and the nobility. If they were both right, it is comforting to know that though the American can lay no claim to nobility, he is also no fool.

Then you "book" for your destination, and as a sign that you have booked, you are given a ticket. I never heard of any one buying one. It is invariably a small bit of pasteboard. If you have not already looked up a time-table, you consult the large scroll which displays between its shifting rollers the time of each train for the next hour and the number of its platform. So great is the number of trains that you are not likely to be kept waiting more than fifteen or twenty minutes.

There is no iron fence to be passed—the tickets are examined just before the train starts. An attendant goes to a large case at one side and selects from the appropriate pigeon-hole a label bearing the name of your destination. He pastes this on your "luggage," which is then conveyed to the "luggage-van." In this way you accumulate a choice collection of labels and are put to some trouble, but finding your trunks unsmashed at the end of the journey almost makes up for it. As you pass down the line of "carriages," the class to which each compartment belongs is seen plainly marked on the door. You walk into one without effort, for the raised platforms, which helped to make the trains look so small, are a great convenience. Inside the compartment, is one long seat facing the front, and another facing the rear. Overhead is generous space for hand luggage. If the compartment is comfortably full you will have from five to seven companions. A ticket inspector looks at your tickets and closes the door (it is never locked) and the train moves off. You then devote yourself to surprised consideration of the glassy smoothness of the road-bed, and the speed of the train. It is a fact that the rate of the average English train is considerably higher than our own. No conductor passes through the train—for obvious reasons; the tickets are given up as you leave the station at your journey's end. If you wish a hot or cold lunch *en route*, a guard will telegraph your order ahead without charge, and it will be brought you in a neat basket. You may eat it at your leisure and deposit the basket under the seat when you have finished. It seems to me that is a great improvement over the American pie-bolting competition known as "five minutes for refreshments." Of course the great disadvantage of the compartment system is, lack of communication with the rest of the train, but in case of necessity the whole train may be brought to a stop by means of a rope running throughout its length. For improper use a penalty of five pounds is attached. Judging from newspaper accounts, "pull the rope" is becoming a popular sport among a certain class of American visitors.

With so many different classes, it would seem easy to cheat the road by buying a third-class ticket and traveling first or second, but it's dangerous. One morning in London I happened into the court-room, where the Lord Mayor was hearing petty cases. A railway attorney had a number of people up for riding without a ticket, or with one of a lower class, and they were being regularly fined thirty to fifty shillings. "The railways have some rights, even if they are corporations," said the Lord Mayor.

In this connection I must submit a little tale:

I give it as told me during the return voyage by one of my fellow-passengers. He told it on himself, but it certainly sounds as though it might have been older: "When I started abroad I was busy, of course, looking up good places at which to stop. I had heard a good deal about the Mansion House in London, and its counterpart in Washington is a favorite hotel of mine, so I put it down on my list, and told all my friends I was going to stop there while in London. When I reached the city, I hailed a cab at once and said, 'Drive me to the Mansion House.' Cabby was evidently much impressed. He bowed, and and then started off at a rapid rate. I thought: 'It's just as I expected—it's one of the swell joints.' Soon we stopped at the side door of the big establishment. I said, 'Why didn't you go to the front?' He said, 'They're receiving here just now, sir.' When I dismissed him with an ordinary fare he seemed much disappointed. A servant in livery opened the door and asked, 'What name?' I said, 'My name is ———, and I—' A curious smile crossed his face. 'O, yes, Mr. ———, we've been looking for you for some time.' (I felt important.) 'Your mail has been coming here for several days. This is the residence of the Lord Mayor. You will find your mail in a packet over at the General Post-office.'"

We reached London a day before the Coronation, but we didn't stop at the Mansion House, for the Lord Mayor was very busy. Imagine your arrival in a strange city, the biggest labyrinth in the world, on the eve of such an event. I joined the army of people who were trying at the last moment to get seats on the stands along the route of the procession. It was worse than shopping on December 24. Seats were more valuable than Beacham's Pills, and every intelligent person knows how much they are worth. And you could see the prices rise while you were watching them. I took in the last that were to be had at two guineas (42 shillings), and considered myself fortunate.

The Whitehall Grand Stand, situated opposite the Government Office, commanded an excellent view. Not the least of its advantages was the fact that it was on that short portion of the road, near the Abbey, that was traversed twice. The occupants were in this way able to see the procession both going and coming, and consequently to have a good view both of the King and Queen, who occupied opposite sides of the carriage. At daylight (and that comes early in England) the crowd began to gather, and long before the time set for the procession, the favored streets were closed to vehicles and to pedestrians not holding passes. The entrance to the Whitehall stand was from the rear, by the Thames Embankment, and this, not being on the line of march, remained open much longer.

We had no difficulty in getting across to the stand at nine o'clock, but we were not too early, for Whitehall was already a scene of great animation. On the right, through the trees, gleamed the red of the Canadian Arch, and on the left the dark tower of the Abbey stood in full view. Tommy Atkins and his brothers from Canada, India, Africa and Australia were marching along the yellow sand that covered the asphalt. They soon lined up on either side and presented an interesting study in uniforms, from the brilliant red coat of the Regular to the natural black of the Zulu.

Finally appeared the first of the procession, led by the band of the Royal Horse Guards, and the tune to which those big black horses pranced was—Sousa's "El Capitan!" I was not sure that my ears were serving me right. The only thing with which I can compare my impression of the bewildering succession of princes, dukes and generals that followed is the thrill that pervaded me when first, as a small boy, I beheld Barnum's circus parade. Now that, if you only realized it, is very high praise indeed, for a child's imagination can seize on tinsel that is in its second season and make it shine with more than royal splendor.

But don't misunderstand me. It was a pageant, to be sure, but hardly an empty one. The spirit of it is hard to comprehend at a distance, but on the spot one felt a little of it, so that it seemed perfectly proper that "King" should be

spelled with a capital K, and that Kitchener and Roberts, however great their generalship and fresh their victories, should be characters of only secondary importance. No one who spent that day in London, I fancy, will expect England soon to give up her monarchy.

During the period occupied by the ceremony in the Abbey, bands along the route kept the crowd in good humor. A Scotch aggregation just opposite to us, whose full-length plaid trousers gave them a very bizarre appearance, favored us with "Oh, Listen to the Band." Up on Pall Mall another band was playing "Marching Through Georgia," which seemed unfamiliar to most of the people, but when they changed to "Swanee Ribber" the crowd put surprising volume into the chorus. And that many Americans were present to appreciate the compliment was evidenced by the clapping that followed. In the rear of our stand was a large open space, where every convenience was provided for the occupants, including a generous supply of refreshments.

Of course, the national anthem was sung a great deal and with a hearty good-will, but one rebellious person produced much laughter by singing at the top of his voice, "My Father and Mother Were Irish." He seemed to feel better for it.

The Abbey chimes were ringing when the procession returned, and the King and Queen were wearing the crowns. The King was bowing and smiling—evidently he had stood the ordeal well. We all sang "God Save the King" in earnest then. Somehow, I wandered off into the wrong words, but those around me looked on indulgently.

The spectacle was not over when the last of the cavalcades had passed, for we lingered long to gaze at the wonderful complex of carriages, commonalty and soldiers that thronged the street. We read that the Indian soldiers who were visiting England are still so jealous of their caste that they won't allow a white man's shadow to fall on them. I presume the word "man" is used in the narrower sense, for I saw several of these same Hindus heroically scaling the back walls of certain noble premises in order to exchange pleasantries with the maids, and to have their canteens filled with most unholy water from the River Thames.

The illuminations in the evening were the greatest ever seen in England (it would require another Niagara to rival the Pan-American display). After 6 P. M. the center of the city, including an area of two or three square miles, was absolutely barred to vehicles of all kinds. But the space was fully occupied. On reaching Trafalgar Square and looking down the slope of Charing Cross and Whitehall, nothing was to be seen for square upon square but a black mass of people. And far beyond, wavering as objects do when looked at through the hot air above a stove, the lights of the Canadian arch formed themselves into this legend: "Canada. Free Homes for Millions. God Bless the Royal Family." As a combination of business with patriotism, that is almost as good as the sign reading: "Monkey Brand. Won't Wash Clothes. God Save the King." As if the king were *all* clothes!

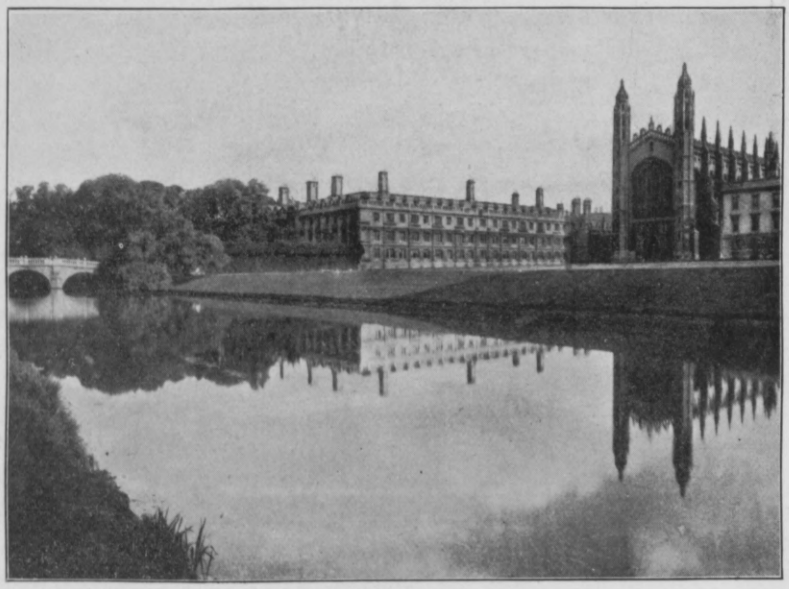
The hideous noise of the torpedo and firecracker, so common in American celebrations, was absent, but their loss was partially made good by the indiscriminate bawling of the national air and popular songs. Of the latter the one most frequently heard was "The Honeysuckle and the Bee." Noticeable among the decorations was the large number of American flags, but this was only in keeping with the signs, "American Soda Fountain," "American Shoes," etc., displayed everywhere.

Two or three days later I paid sixpence for admission to the Abbey. Five thousand, nine hundred and ninety-nine people did the same thing on the same day, so there were several people in front and behind. In fact, we stood an hour in a line two miles long, "and all," as one of the papers said, "to see two chairs and a piece of carpet." The venerable monuments that we would have liked so much to see were completely hidden by upstart wooden stands.

Nearly all the places of amusement that were

open at all presented programs appropriate to the coronation season. The prices of admission may be of interest, so I have copied the list from an Empire program· "Boxes, 1 to 3 guineas [a guinea is a pound and a shilling]; fauteuils, 7s. 6d.; stalls, 3s.; grand circle, 3s.; pit stalls, 2s.; pit, 1s.; gallery, 6d." Only the "fauteuils" are reserved—for the rest you form in line. If, however, you wish to pay sixpence extra you may take advantage of an "early door"—which opens 15 minutes before the others, and so have prior choice among the seats to which your ticket entitles you. Programs are never given away; the usual price is a penny. I was at the Empire on "Shah of Persia night," and saw that ruler after the performance—at least I think I did. There were six carriages in the party and they drove rapidly away. I saw all six, but no one knew in which the Shah was. One of the queerest sensations I ever experienced was witnessing a performance of "In Old Kentucky," in gray old Chester. Imagine yourself amid such surroundings, gazing upon the scene which is laid in the parlors of the Phœnix Hotel! The "Colonel" had a fine English accent and the mountain girl spoke delightfully of pa*pa*, but still it was enough to make one homesick.

Out at the Zoological Gardens I found a friend of mine—in front of the bars—a Harvard chemist, and we visited several places together. One day while we were nosing about in a second-hand bookstore on Charing Cross Row, we found John Burns, the labor leader. Or rather, he found us, for he opened the conversation by asking if we were Americans. A most interesting conversation followed, during which we strolled along some of those famous old streets in the heart of the city. Mr. Burns is interested in art and books as well as strikes, but naturally it was on the latter subject that we questioned him most. He told us about his great dock strike and was so kind as to inform us that the future of America worried him more than any other question. "We hope to pluck you as brands from the burning eventually," he told us. Perhaps in that case we may be of use in relighting the fire under England's boiler.



KINGS COLLEGE CHAPEL AND CLARE, CAMBRIDGE.

My friend and I were both anxious to see one of the University towns and so one day we made a pilgrimage to Cambridge. That allwise guidebook says that Oxford possesses the greater

charm, but I leave it to any Cambridge man if that is so. Certainly nothing could be more charming of its kind than the latter's "Backs." The Cam flows in gently curving course through the town, and passing each college in turn, is spanned by a bridge which leads to shaded gardens. It is only a small stream, but this succession of arches dignifies it as much as it beautifies its banks. We were free to walk through the buildings, but the students were away, and the University lay sleeping. We wandered through the silent laboratories and even blundered into Prof. J. J. Thompson's private office. A pile of June examination papers lay on the desk, covered with dust and long-forgotten knowledge, which a spider had pronounced satisfactory. We turned away in silence.

Soon after this I left the rest of the family in London, to keep a little engagement in Terre Haute on the 17th of September, but not without making a flying trip through Scotland on the way to the steamer. A company of K. O. S. B.'s (King's Own Scottish Borderers) accompanied us from Edinburgh. To a train comfortably full add 150 soldiers in the same condition; when the passengers are exhumed the civilians will be found on the bottom. The train had all it could carry. So did we. And so did the K. O. S. B.'s. But rough though they were, the men in khaki were good-natured and interesting companions. They were new arrivals from South Africa and were going to their homes for a well-earned vacation. Many had been in the service continuously for as long as seventeen years, and wore the ribbons of four campaigns. The civilians looked as if they were proud to be sat upon.

Edinburgh has been called—justly, so far as my limited experience goes—the most beautiful city in the world. I had hardly more than started on a self-conducted tour of its historic spots when I met, strolling on the castle esplanade a gentleman connected with the Infirmary, one of the largest hospitals in the world. A Scotchman by birth, he had gone later to London, where he had received his medical education, and some polish as well. Apparently he was about forty. One could almost guess his profession from the style of his silk hat and his pointed beard. From our vantage-point he indicated the Infirmary and other notable buildings. We walked down again to Prince's street together, and as it was now raining, I got my umbrella from the hotel.

The result of our conversation was that Dr. John Bain and I spent the morning in each other's company, visiting the Palace, St. Giles, and other places, with all of which my friend was thoroughly familiar. He knew several of the officials in charge, and it was great sport to hear him "have a wee crack" with them in broad Scotch. There was nothing for me to do but invite him to lunch with me, leaving him to choose the place. After some show of reluctance he selected a very modest, but well-kept establishment. We continued our explorations till about four o'clock, when Dr. Bain excused himself, saying that he was to take tea with a friend. He added, however, that he would be at leisure two or three hours later, when the principal streets become popular as a promenade. I hesitated a moment, for I wished I might know a little more about this "guide, philosopher and friend," that I had found so recently. And yet, it would hardly begin to grow dark till after nine o'clock and the principal streets were safe enough. Yes, I would go. We met at 6:30. The promenade was all that could be desired. Dr. Bain was a most entertaining talker, and by and by it was after nine o'clock. My friend proposed climbing to the top of Calton Hill; there was a very fine view to be had from there, he said. The view was there, right enough—the whole city, now lighted up, lay at our feet, and a distant line of lights marked the coast of the Forth. But it seemed to have grown dark suddenly, and there were no people on that part of the hill to which we had come. I recalled the robbing of a Canadian two or three days before, and of an American only a day earlier, and the many crimes that had been committed among the rocky recesses of this same Calton Hill. I looked around for the accomplice:

there he stood, at a dark point in the narrow path just a few feet ahead of us! Just then we turned a corner—and the next moment we were in the full blare and glare of Prince's Street. Nothing had happened. I smiled at myself and thanked Mr. Bain for a very pleasant evening. What do you think? He asked if I could loan him a little silver to get home on, as he had no change, etc. With a feeling of some disgust I pulled out a half-crown and asked if that would be enough. He thanked me profusely, said he would only use a little of it and would meet me next day at a certain place and hour, when he would repay me. I went back to the hotel rather puzzled. Why should a clever man devote himself to a stranger all day for the sake of a lunch and the doubtful hope of a little silver? Perhaps this was only the first move.

Next morning I made some inquiries and this is what I learned: that Mr. John Bain, though undoubtedly a man of parts, was a very unsafe companion and that he had swindled a good many people to the extent of a good many pounds. Knowing his address, I couldn't resist writing the following note:

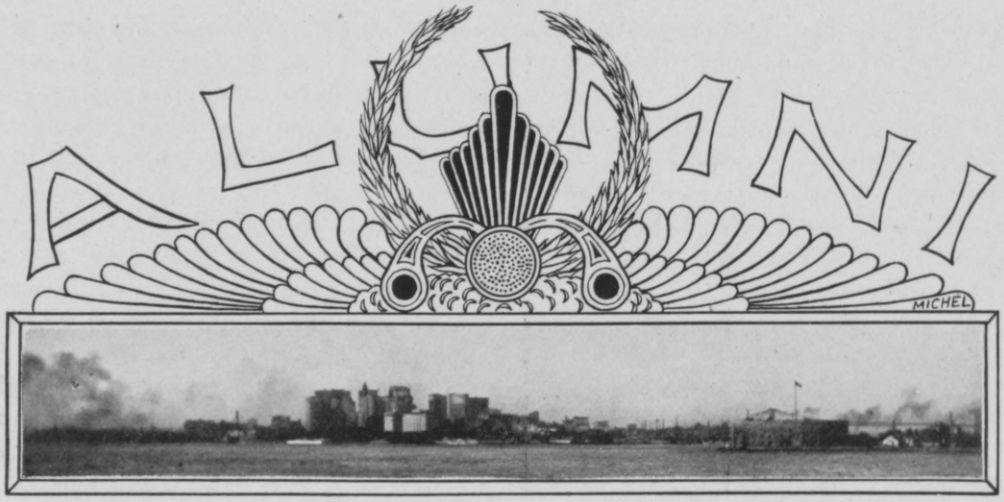
EDINBURGH, Sept. 3, 1902.

My Dear Doctor Bain:

Notwithstanding the delightful day which we spent together, I have taken the precaution to make some inquiries, and you will therefore pardon me for not keeping my engagement with you. I am just leaving for Glasgow. You are quite welcome to the lunch and the half-crown, and I shall be disappointed if you do not take this in good part and send me a postal on the *Umbria*, Sept. 6th, by way of farewell.

Very truly yours, etc.

When I boarded the vessel three days later the mail for the passengers was waiting for them, and sure enough, there was a postcard with my name on it. I turned it over—but it was not from John Bain.



Steam Superheaters—Effect on a Pumping Plant.

By FRANK A. WHITTEN, '98.

THE writer had the opportunity of assisting in a series of tests of the engines of the Central Park Avenue and Springfield Avenue pumping stations of the City of Chicago, when they were first put into operation. Later, it was decided to install superheaters, and I had charge of the plants while superheaters were installed on one battery of boilers, as an experiment, and during subsequent tests, which led to the decision to equip all the boilers with superheaters. This work is not yet finished, although one station (Central Park Avenue) is practically complete.

The two stations are duplicates, except as to some slight difference in arrangement. Steam in each station is supplied by six 225 H. P. boilers, of the Scotch Marine type. They are equipped with Hawley down-draft furnaces, on the grates of which Maryland smokeless coal is burned.

The boilers are 10′ in diam. and 12′ long and have 4″ fire tubes, and two Morrison corrugated furnaces 36″ in diam. The feed water is drawn direct from the delivery of the main engines and passes first through the heaters in the main exhaust pipes from the low pressure cylinders, then through an auxiliary heater in the boiler room where its temperature is raised by the exhaust of all auxiliary machinery. These heaters are both of the standard closed type, built by Henry R. Worthington. Before it enters the boilers it passes through "Buffalo" live steam purifiers.

The steam (before the superheaters were put in) passed directly from the boilers into a 12″ header, from which it was distributed by 5″ lines to each of the engines.

The engines, of which there are three in each station, are the standard Worthington, vertical, "high duty," triple expansion condensing duplex pumping engines. Each really being two tandem triple expansion engines side by side, one throwing the valves for the other. The sizes of the H. P., I. P. and L. P. cylinders are 21″, 33″ and 60″ in diameter respectively, and all of 50″ stroke.

All cylinders are steam jacketed and the H. P. and I. P. Reheaters contain brass reheating tubes. The jackets and reheaters are supplied with live steam direct from the main steam line. The plungers of the water end which are double acting with external stuffing boxes, are directly connected to the steam pistons. They are 34″ in diameter.

The engines are equipped with the standard

Worthington "high duty" attachment and balancing device. The valve motion is of the Worthington Corliss type.

The surface condenser is placed in the suction pipe, and all the water pumped by the engine is used as circulating water and the temperature of the condensed steam is reduced to within 2 or 3 degrees of that of the water in the well. The air pump is driven from the cross head of the main engine.

The engines when supplied with steam at 140lb pressure were guaranteed to pump 20,000,000 gallons of water each in 24 hours, when running at 140′ piston speed, and to develop a duty of 135,000,000 ft. lbs. with each 1,000lb of dry steam used.

A large number of cards were taken and a series of tests were made after the engines had been running a short time, all of the results of which, for business reasons, I cannot give.

As there was a clause in the contract giving a cash bonus for each million ft. lbs. obtained over the guarantee of 135 million, it was decided to install superheaters as one method of raising the duty. The city consented on conditions that the contractor should receive no bonus for any duty obtained greater than 150 millions.

Investigation showed that superheaters could be installed at a comparatively small cost, and with no very great alterations of the original arrangement. The construction of the boilers is such that it was easy to put an extension, sufficiently large to hold the superheaters, on the combustion chambers at the rear end of each boiler.

The superheaters are known as the Foster Superheaters, and they are a modification and combination of several well known German types. They consist of cast iron pipes connected by return bends. The heating surface is increased by circumferential flanges or ribs and the flange joints are of a special patented fire-proof construction. The total external area of the superheater exposed to the fire is 375 sq. ft. The internal area is 109.4 sq. ft.

A word as to the rate at which heat is transmitted through the superheaters to the steam. On November 21, 1901, 7,751lb of superheated steam were drawn through a superheater. The steam came from the boiler at a pressure of 141lb and at a corresponding temperature of 361° F. and carried with it about 3% of moisture. On leaving the superheater the temperature was 469° F.

3% of 7,751lb=232.5lb. To evaporate this moisture into steam requires $232.5\times858=199510$ H. U.

To raise the temperature of 7,751lb steam from 361° to 469° required $7751\times108\times.48=411811$ H. U.

The total heat transmitted to them was $411811+199510=611321$ H. U.

The time of test was 90 minutes and the number of H. U. transmitted per hour was therefore 407547 or

$\frac{40754.7}{375}=1087$ H. U. per hour per sq. ft. of external surface of the superheater or

$\frac{40754.7}{109.4}=3734$ H. U. per hour per sq. ft. of internal superheater surface. The temperature of the gases in the combustion chamber during this test was about 1450° F.

From the first two boilers which we equipped with superheaters, we ran a 3½″ pipe to one engine instead of the 5″ pipe originally in place. This we were able to do on account of the greatly reduced friction due to the use of superheated steam. It also made the velocity greater, thus allowing less opportunity for radiation losses. We found in operation, however, that our superheaters were amply large to give us all the superheat that we would want even with the 5″ pipe, and therefore, in the final arrangement, we are using all of the original 5″ piping. The economy would be slightly increased by the use of smaller steam pipes, but not enough to pay for changing all the present piping.

No alterations of cut-offs or other adjustments of the engine were made from what they had been for saturated steam, when the engine was starated with superheated steam for the first time. The main throttle was partly closed as the cut-offs were adjusted for running against the

contract head of 150′ and the ordinary running pressure is usually about 110′. The engine ran under these conditions for several weeks. When we wanted to run under contract conditions, it was necessary to throttle the delivery to get the required head. When we tried for the first time to run under contract conditions, we found that with the throttle wide open, the engine would not run over 96′ piston speed with practically the same adjustments and conditions, under which it had run 149′ with saturated steam. Table 1 gives a comparison of these conditions, see also Table 2 for a further comparison of two sets of cards taken under these conditions.

We found that it was necessary to run the H. P. cut-offs out to about six-tenths of the stroke to get speed, all other conditions remaining the same. The explanation of this undoubtedly lies in the fact that the saturated steam we had been using was very wet. Tests made with a throttling clarorimeter showed about 3% moisture. I do not consider this test reliable, and believe there was about 5% moisture. All the cylinders and receivers being steam jacketed, any moisture and cyclinder condensation would be re-evaporated, and would do work in the engine at the expense of the amount of steam used in the jackets. Full steam pressure was carried in the H. P. and I. P. jackets, and about 25lb in the L. P. jackets, and under these conditions, when running with saturated steam, the low pressure exhaust was frequently slightly superheated.

As to the increased economy in the cylinders only directly due to superheating, we must remember that the specific heat of superheated steam is about .48, while the volume of the steam is directly proportional to its absolute temperature. In our case the volume of 1lb of saturated steam at 140lb (gage)=2.89 cu. ft. and its absolute temperature is 360.7°+461°=821.7° F. The temperature of 1lb of steam superheated 150° is 821.7+150=971.7° and its volume is $2.89\times\frac{971.7}{821.7}=3.42$, an increase of .53 cu. ft., or 18.3%.

The total heat of a pound of steam at 140lb is 1192 H. U. To superheat 1lb 150° requires $150\times.48=72$ H. U. It therefore takes to superheat 1lb 150° only 6.5% of the total heat required to evaporate water into steam, while the volume is increased 18.3%.

Another interesting point is the amount of steam condensed in the jackets and exhaust reheaters under various conditions. When running with saturated steam (about 3% moisture), the percentage which was condensed in the jackets was 15.1% (of the total steam used). This result is the average of fourteen tests. When superheated steam was used with approximately the same pressures as before, in all jackets and reheaters the percentage of condensed water was 10.06 (an average of five tests.)

As a first step in an endeavor to see whether it might not be possible to run without steam in the L. P. jackets, we again measured the temperature of the L. P. exhaust. We found that when running with superheated steam that the L. P. exhaust was superheated about 10°. A good deal of the heat being carried away by the exhaust was recovered by the feed water heater in the exhaust pipe. We wanted, however, to save as much of this heat in the engine as possible, as the engine was to receive no credit for heat returned to the boilers by the feed water or hot water from the jackets. We therefore shut off all steam from the L. P. jackets, leaving full pressure on the H. P. and I. P. jackets and exhaust re-heaters. We were somewhat afraid that the L. P. cylinders without the jacket steam, might cool sufficiently to make trouble by increased friction, but we experienced no trouble from this source, the engine running as well as before. It was necessary, of course, to put steam into these jackets when the engine was shut down in order to heat the cylinders before the engine could be started. Being able to run without the L. P. jackets was especially advantageous from the fact that the jackets on these cylinders, when in use, were still heating the steam in the cylinder on the exhaust stroke, which was, to the engine, a total loss.

Tests made with no steam in the L. P. jackets showed a percentage of jacket condensation of only 6.84. As the tests made under these condi-

tions showed but a very slight drop in the duty on steam used in the cylinders only, it was decided that this was the best running condition for the engine.

It might be well to state that the percentage of jacket water from an engine of this type is always quite large. The principal reasons for this are the use of six steam cylinders, thus greatly increasing the radiating surface, and the fact that there is quite an appreciable pause at the end of every stroke.

I very much regret that, for business reasons, I am unable to give the results of the tests which have been made showing the actual total economy resulting from the use of superheated steam. But I will say, that there was found to be a sufficient saving to pay for the installation of superheaters, necessary alterations of piping, recovering of all steam pipe with a better non-connecting covering, the loss of time, and interest on delayed payments. The contractors will receive a bonus of $1,000.00 on each engine for each million ft. lbs over 135, which may be obtained with each thousand pounds of steam used, up to a limit of 150,000,000.

I expect, when final tests have been made to submit a report giving copies of the results of the official tests.

NOTES.

All steam and exhaust valves of these engines are of the Corliss semi-rotative type, and the pistons are fitted with the "Wheelock" segmental rings forced out by steel ribbon springs. Frequent examinations of the H. P. valves, pistons and cylinders, after the use of superheated steam was begun, showed no deterioration of any part or any damage from poor lubrication. An excessive quantity of cylinder oil was used at first, and when the H. P. steam valves were pulled out, a quantity of oil in good condition would be found lying in the valves. The first engine has now been in operation almost without a stop for eight months, and no bad effects have been found. It seems probable that a saving in oil will result, as the steam contains no moisture to destroy the lubricating effect of the oil.

It was planned to have the steam at the engine at about 520° F. The average temperature approximates this very closely, but there is some fluctuation with the firing of the boilers. This will not be the case when all the superheaters are in place and steam for all the engines is drawn from one header. The temperature at the engine once got as high as 700°, due to the opening of a valve from the top of the boiler, which was supplying the engine, and drawing off about one-third of the saturated steam, which the boiler was generating, leaving only two-thirds of it to pass through the superheater. The engine ran under this condition for nearly a whole day before we knew that the engineer had opened this valve. No damage was done, however, other than burning the covering from part of the steam pipe. This was what drew our attention to the excessive temperature. The cylinder oil used was said to have a flash test of 575° F. and a burning test of 640° F.

There was a considerable loss in the engines, due to excessive radiation, as the cylinders were not well covered with non-conducting material.

The average fall in temperature of the steam in passing through 70 feet of 3½" pipe (well covered) at the rate of 6,800 lbs. per hour was 37°.

These engines were not designed for the use of superheated steam and with the different ratio of cylinders, better results could probably be obtained. The water cylinders of these engines have outside packed plungers and the efficiency is therefore low (about 90%) and varies from time to time with the condition of the plunger packing.

No trouble was experienced from the superheaters getting covered with dust and soot as might have been expected. They were never cleaned or blown off and at the end of a run of six months, they were practically as clean as the day they were put in place.

Great care must be exercised in laying out steam lines and connections for the use of superheated steam on account of the greatly increased expansion. In our main header at the Central Park station the expansion is almost 3".

Pumping station loads are so constant that it is unnecessary to put in dampers or other regulating devices for controlling the amount of hot gases which pass around the superheaters in order to control the degree of superheat.

In view of the results of many tests which have been made it seems doubtful whether, in many cases, it will pay to use triple expansion engines. The small saving by the use of triple instead of compound engines will scarcely pay for the increased cost of the triple expansion engine when superheated steam is used on both the compound and triple expansion engines.

TABLE I.

Date.	Steam	Steam Pressure.	Vac.	Pump Load.	Stroke.	Piston Speed.	H. P. Cut-off.			
							No. 1 Side.		No. 2 Side.	
							Top	Bot.	Top	Bot.
3-21-'01	Saturated.	147. lb	26″	65.10 lb	4.124′	148.7	22.6″	22.6″	22.4″	22.4
10-14-'01	Superheated.	145.4	27.1	64.98	4.133	95.7	23.	23.5	23.	24.

Date.	I. P. Cut-off.				L. P. Cut-off.			
	No. 1 Side.		No. 2 Side.		No. 1 Side.		No. 2 Side.	
	Top.	Bot.	Top.	Bot.	Top.	Bot.	Top.	Bot.
3-21-'01	31.″	31.″	30.8″	30.1″	33.″	31.″	27.4″	29.
10-14-'01	29.5	31.	29.	29.5	32.	31.	29.5	31.

NOTE.—These are not the actual points of cut-off in the cylinders, but are readings of the index marks on the valve motion. They will do as well for comparison, as the actual points. They are not far wrong, anyway.

TABLE II.

Date	Steam.	Cards.	Point of Cut-Off.				Mean-Effective-Pressures.								
			H. P.		I. P.	L.P.	Actual.			Re'd to area L. P. piston				Piston Speed.	Plunger Load.
			Actual	Theoretical			H. P.	I. P.	L.P.	H. P.	I. P.	L.P.	Total		
1-16	Saturated	Actual	.400	.341	.570	.460	54.50	18.00	10.20	6.63	7.33	10.20	24.16	150.0′	64.60 lb
		Theoretical		″	″	″	61.97	18 23	9.45	7.53	7.42	9.45	24.40		
3-21	″	Actual	.450	.371	.540	.570	57.70	21.80	11.40	7.01	8.87	11.40	27.28	147.2	65.30
		Theoretical		″	″	″	68.32	19.98	10.23	8.23	8.14	10.23	26 68		
10-14	Superheated	Actual	.440	.380	.570	.570	61.40	22.30	10.40	7.97	9.07	10.40	27.44	96.5	66. 40
		Theoretical		″	″	″	69.33	18.91	10.90	8.43	7.70	10.90	27.03		
10-19	″	Actual	.600	.458	.553	.533	58.80	23.60	9.20	7.16	9.60	9.20	25.96	149.0	66.10
		Theoretical		″	″	″	67.51	21.87	11.59	8.21	8.88	11.59	28.68		
11-29	″	Actual	.560	.447	.560	.520	61.00	18.70	9.60	7.4.	7.61	9.60	21.62	148.3	66.60
		Theoretical		″	″	″	66.40	23.10	12.90	8.07	9.40	12.90	30.37		

The Puget Sound Country.

By HARRY W. PALMER, '03.

THE section of country lying between Puget Sound and the foothills of the Cascade Mountains, extending from the head of the Sound in the southwestern part of Washington well up into British Columbia, and commonly known as "The Sound Country," has so many natural advantages that it has been developed very rapidly during the last few years. Many people, attracted by the cheap transportation rates during the Klondike rush in 1897–98, found there a much easier and surer road to wealth and happiness than did some of those who went to Alaska.

The clear, deep water of Puget Sound, from which rise hundreds of rocky islands covered with evergreen, is something which, once seen, is never forgotten. Deer and game birds are plentiful on these islands, and great numbers of waterfowl nest among the rocks along the shores. All these, together with the fish, crabs and clams, make it easy for those so inclined, and there are many such, to live strictly on the fat of the land and water.

The narrow straits through which the water must pass in going to and from the ocean as the tide falls and rises, cause a strong current to flow back and forth among the islands. At times, when the tide is right, opposing currents between the islands cause the water to boil as in a caldron, making it somewhat dangerous for small boats. Deception Pass, true to its name, is one of these places, and many quite large boats wait for the current to change before venturing through. The deep water, however, even close up to the shore of the sound, is very favorable for the many vessels that take on or unload their cargoes at the numerous towns and cities.

In places, along the shore, the land is protected from the tide by dikes. This land is exceedingly fertile, and, although the dike tax may be heavy, the wonderful production of this recovered land, and the excellent facilities for shipping, make it valuable for farming.

Beginning only a few miles from the shore and extending far into British Columbia, south into Oregon and east to the foothills of the Cascades, is the section comprising the great wealth of the Sound Country—the timber land. This is truly the wonder of the Northwest. Here are thousands of square miles covered by the most magnificent growth of fir, cedar and hemlock in the world. One who loves Nature as she is found, can not but be filled with awe at the stately grandeur of these trees, many of which rise three hundred feet. These massive columns supporting their canopy of evergreen which casts a

cool shade on everything below, causes one to feel that he is in a sacred place, and he realizes, as never before, the truth of Bryant's words:

"The groves were God's first temples."

In the more settled portion, one can drive along the narrow turnpikes which are bordered on either side by these tall firs, and note a wonderful effect of light and shadow. The sun shining down on the road makes the shade in the wood seem more intense.

The firs are found principally on the low lands near the lakes and rivers, the cedars grow on the benches farther back and the hemlocks cover the hills and smaller mountains. The fir and cedar lands, being nearer to the water and consequently more easily logged, are being cleared of their timber very rapidly in many sections. Logging camps working as many as seventy-five or one hundred men are common. Some of these camps run a shingle mill in connection to work up the cedar, while the fir is rafted and towed down to the large saw mills on the sound. The process of handling these great logs, many of which are eight or nine feet in diameter and are cut from twenty-four to forty feet in length, is rather an interesting one.

The falling is done by men who understand their business, for a mistake resulting in the splitting of the log means a loss of considerable moment to the owner. An undercut is chopped in by a man whose good judgment and experience tell him the safest place for the tree to fall. After him come the fallers, sawing from the opposite side of the tree toward the undercut, wedging over the tree as they proceed. The trees are often cut several feet from the ground, as the stump is very large low down, and also to escape the hollow butt often found in old trees. In order to do this the men stand on spring boards held in place by being inserted into a notch chopped in the side of the stump. The accompanying cut shows one of the largest trees in the northwest lying as it fell. A twelve foot cube was cut from the butt log of this tree and sent to the Paris Exposition. A cube containing twenty thousand, seven hundred and thirty-six feet of clear lumber.

A Fallen Monarch.

The trees are cut into logs from twenty-four

to forty feet in length and hauled with blocks and tackle by six- or eight-horse teams, to the main skidroads. This is known as yarding, and is sometimes done in large camps with a donkey engine instead of teams. The skidroads run from a landing on the river bank or lake shore, as the case may be, and branch off into the different parts of the timber. They are built as nearly level as possible, the skids being logs nine feet in length and set like ties, but farther apart, the distance usually being nine feet. The skids are hollowed out slightly on top to prevent the logs rolling, and are kept greased so that the logs, being newly stripped of their bark, slide with comparative ease. A donkey engine stationed at the landing, will haul down a turn of seven or eight logs with a cable sometimes over a mile in length. In places where the timber is some distance from the water, railroads are used, sometimes the locomotive hauling the logs over skids, but more often on flat cars.

At the landing the logs are scaled, stamped on the end with the owner's mark and rolled into the water. Here they are rafted; four boom sticks, fastened by chains, forming a rectangle of about sixty feet by seventy-five feet, and the interior filled with logs. These rafts are towed down to the mills by steam tugs.

Throughout the heavily wooded section of Washington and British Columbia, wild game is still plentiful and the lakes and streams are full of trout. Salmon also run up the rivers and to the very heads of the small streams. The history of a Pacific salmon would be interesting could it be followed closely throughout its life, but there are many things to be learned about this useful food-fish. The salmon are hatched in the head waters of the streams. As they grow they work down to the salt water, where they remain until they have come to maturity and are ready to seek the spawning places. Some people who claim to know, say that a salmon always spawns in the same stream in which it was hatched. Who can dispute this? When the spawning season comes on, the only thing which a salmon seems to know enough to do is to swim up stream. It does not eat after it reaches the fresh water, and even after the eggs are all deposited it still strives to go farther up, sometimes swimming through water too shallow to completely cover it, and sometimes battling against rapids and waterfalls, until it wears itself out and dies.

While the salmon are gathering around the mouths of the rivers, preparatory to going up stream, great numbers are caught in nets and traps for the canneries. The fish are cleaned and washed thoroughly in running water, and passed quickly on to be cut up and packed into the cans. The covers are then fitted on, and the cans caused to roll through a V-shaped trough, in the bottom of which is kept a little molten solder. This hermetically seals the packages. The cans are then placed on a small car and wheeled into an oven where the temperature is kept nearly constant, and left until sufficiently cooked. Immediately after taking the cans out of the oven they are each tapped on the end with a small mallet to detect any leak ; the steam pressure in the perfectly tight ones making the sound of the tap different from that on those where the steam has leaked out. The ones in which leaks are discovered are thrown away. The tapper then pierces the end of each can to ease up on the pressure and allow the end to become flat. These holes are afterward soldered by hand and the labels pasted on the cans, which are then packed into crates for shipment. The whole process is a short one, the cans being boxed up in a very few hours after the fish are taken from the water.

The eastern border of the Sound Country, the foothills of the Cascades, differs greatly from the rest of that section. Instead of luxuriant vegetation, are deep canyons through which the water, from the snow capped mountains on either side, rushes down over great boulders to the lowlands. Many of these streams contain no fish, as the glacier water will not support animal life. The mountain slopes have some timber near the foot, but farther up there is nothing but moss, lichens and scrubby brush, beyond which, if the mountain be high, is perpetual snow.

These slopes are the haunts of the mountain goat. This animal, which is not a goat but a specie of antelope, is pure white with jet black horns. It is very strong of limb and is noted for its ability to climb to apparently inaccessible places and for its great vitality. The hunter realizes the truth of this when he sees one serenely carry away the contents of his Winchester to some place where he cannot follow. A good sized mountain goat weighs about two hundred pounds.

On these slopes are also found the white ptarmigan and little-chief hare. This little rodent is of great interest to naturalists, as it is found in but few places in the world. It much resembles the rabbit in form and action, but is no larger than a mole. The little animals live among the rocks and may be seen in bright weather, sunning themselves or hopping around gathering bits of herbage, which they store up to be used later.

Black bears are common throughout the whole of the Sound Country, as are also cougars and wildcats. The bears live largely upon salmon, but do not hesitate to rob a farmer's fruit orchard or beehive. The cougars prey upon deer and smaller animals, but seem to fear man as much as they are feared by him.

There are still many Siwash Indians living along the streams and rivers of the Sound Country. They live to a great extent upon salmon and game, and are very skillful in handling canoes in the swift water of the rivers. The nature of these Indians seems to be very different from that of the Indians of the plains. Their strongest characteristics, cowardice and ingratitude, are illustrated by the following incident.

A man from the East settled in a little town on the Skagit river. He had read of Indian nature and maintained, in spite of what his neighbors told him, that the way to get along well with an Indian was to treat him well. One day, in the beginning of winter, an old Siwash came to his house and begged a mess of potatoes, and because he obtained what he asked for, he kept it up each day through the whole winter. When spring came the man turned out a fine pair of steers to pasture, and this same Indian killed them both, loaded the beef into his canoe, took it to the next town down the river and sold it. He did not dare steal from any other man in town. That man says that he will yet reform the old Siwash. His method of doing this may be inferred from his further statement: "The only good Indian is a dead Indian."

Years ago, before many whites settled along the Sound, it was the habit of the Siwashes to strap their little babies to a board and keep them there until they were old enough to learn to walk. Another board was lashed over the child's forehead and these thongs were never loosened as long as the child remained tied. The consequence was that the head became flat on the back and the forehead sloped backward from the eyes up. It is not an uncommon thing to-day, to see an old Siwash wearing a cast-off Derby hat with the front and back above his ears. It fits him better that way.

The climate west of the Cascades is mild, and although there is much rainfall during the winter, the people seem to enjoy exceedingly good health. The great natural wealth of the Sound Country, with the splendid facilities for shipping to all parts of the world, the increase in importance of the cities within a few years and the natural industry and perseverance of the people, make it safe to predict a grand future for the state of Washington.

Recollections of Havana

By CHARLES B. FALLEY, '05

CUBA in '98 was a veritable wonderland to the American soldier. The style of architecture, the strange state of anxiety which was evidenced by all, and the conditions and manners of the natives were each foreign and ofttimes ridiculous to the average "go-lucky" member of "Uncle Sam's" army.

In the country all was barren, overgrown with rank vegetation, and abundant in robbery and murder. The roads were lined with block houses and fortifications enclosed with a tangle of barbed wire fence above deep pit-falls. Ruins of homes which had been perfect palaces, were overgrown with weeds and the spreading vines of a tropical forest. The streams were poisoned and the springs were filled with the bodies of horses, or once in a while, of men. Bandits hung about in the mountains and swooped down upon the man who tried to re-open his plantation. In the city it was different. Here the continual presence of soldiers made order a necessity. Huge, creaking carts drawn by from four to seven horses in single file, hauled tobacco to the wharves and returned to the suburbs with loads of food and clothing for the starving reconcentrados, whose diminishing number daily added height to the ancient piles of bones in Colon cemetery.

Havana was visited by the Seventh Corps before it had seen much of the rural districts and the first strange things one sees are the ones he remembers most about. The buildings are all of stone and built comparatively low. It is said that there is not a glass window in the city. Iron bars on the outside and shutters on the inside take the place of these and give each home the appearance of a jail. The buildings are usually constructed around a court, which is provided with a fountain, two or three banana trees, palms, and other cool foliage plants, thus affording a fine place for an afternoon nap, or siesta as the Cubans call it; something which even the most energetic among these people would not think of giving up.

The streets are narrow—so narrow, in fact, that an old Spanish law compelled vehicles to drive up one street and down another. Moreover, they were extremely dirty and flooded with water in the rainy season. The sidewalks consisted of narrow, thick blocks of stone, laid end to end, and were only wide enough for one person at a time. It is customary for people to keep on the right side of the street. If two society men of the city happen to meet on the walk neither will hazard his honor by stepping into the street and allowing the other to pass. A duel is thus started, the end of which is often similar to the gallant (?) French encounters we hear so much about.

It is certainly true that no one could be blamed very much for not wanting to step off the walk, for no reasonable attempt had been made at sanitary improvements and what few poor sewers there were had long been clogged and their intended contents stacked up in the alleys. Filth of all description, old bones, rags, and decaying vegetable matter formed such a carpet on the streets that it is no wonder that a certain detail, appointed to inspect these places, reported the whole city to be alive with yellow fever germs, some of which were almost as big as rats. A few days later, natives armed with corn knives and baskets were looking all over town for some of the Americano germs, and expected to be well paid for their search. The newer part of the city, however, was in better condition. Here were drives, a beautiful public garden, and a

street car line which was certainly an oddity. Its motive power consisted of Cuban ponies. These were strung out in one long row, the smaller ones in the lead, and when two cars met on a corner a collision was certain to occur. It was no uncommon sight to see the teams of two cars get so twisted together and tangled up that traffic would be stopped for half an hour. Such stops as these, however, were often instructive as well as interesting. They gave one a chance to really understand what a fine vocabulary of oaths the English language possesses and how admirably a stranger to our tongue, by its aid, could rid himself of a pent-up desire to be desperate when mother words had completely failed him. It also paved the way for many a pleasant friendship with the people in the houses along the street. When the Cuban youth calls on his dark eyed senorita he must stand outside the iron bars of the door-like window and talk to her from there. The American was not slow to adapt himself to this custom and many a happy couple have congratulated themselves that iron bars instead of glass are used in the windows of Havana.

While one was thus engaged in an endeavor to trade his knowledge of the English language for some few Spanish words and phrases, he would doubtless be surprised to see a drove of cattle stop in front of the house, a servant come out with a jar and give it to the herder who, after milking the required amount in it, would receive his pay and drive on to the next place. This is the way that milk in Cuba is always delivered and it certainly has the advantage of being a safeguard against adulteration. How much more would the average American boarder enjoy life if he only knew that the entire amount of his daily allowance of cream came from as pure and natural a place as this.

These are only a few of the odd customs common in this great south sea, commercial town. There are many others which interest one greatly, though perhaps in a different way from those above. But there are few natural drawbacks to the island. In all ways it is one of the most beautiful spots on earth and would be one of the most pleasant, naturally, were it not for the insects. Flies get into your mouth, into your eyes, into your nose. Lizards, cockroaches and snakes inhabit the bed; ants eat up the weekly paper and scorpions and tarantulas run races across the floor. Everything bites, stings or scares you nearly to death and every moment you are annoyed by some specimen of the zoological world. A nondescript with nine wings goes clattering around the room; a what-not with fourteen legs is struggling in your glass of water, or a centipede, which is said to be very poisonous, is tearing across the table. When you shake out your blanket in the morning the Cuban fleas hop from it like smoke arising from damp straw; unfold your cot and you find it full of tree toads, while chamelions rush about over your pillow in numbers greater than 'Arry's tales to a Freshman.

These are the things which help us to put up with our snows, fogs and blizzards and assist us to endure the would-be apothecaries rushing about with tonics and gargles. And no matter how desirable the place may be, how blue its skies or how fresh its air—the customs of the people and the conditions of the place, either natural or brought about by man, are often of a too much foreign taste and only make us weary of the whole.

SYMPHONY CLUB CONCERT.

The concert given by the Glee Club and Orchestra Tuesday evening, Dec. 9th, at the First Congreational Church, was a complete success. The concert was given for the benefit of the 1905 *Modulus*, which is in the hands of the present Sophomore class, and the goodly sum which was realized will be a good start. The following is an extract from the *Gazette* of Dec. 10th:

Last night at the Congregational Church the second annual concert of the Rose Glee Club aud Orchestra was given. A large and enthusiastically appreciative audience was present, filling the church.

Mrs. Allyn G. Adams, under whom the Glee Club has been studying, was director. Mr. Hugh McGibeny has been director of the orchestra for some time, and last night conducted the playing. Carl Fischer, of the Class of '03, was the pianist. Every number by the Orchestra and Glee Club was encored. In fact, the audience seemed unable to get enough. Request was sent up for "The Little Brown Church" and "On the Banks of the Wabash." Announcing these requests, Mrs. Adams said she did not know which to give. Quickly the audience helped her out of the difficulty. Voices from all over the church suggested both. Both were given. N. Hadley Cox, of the Class of '03, sang the solo for both songs.

Since the concerts last year, the Orchestra and Glee Club have both been strengthened. Under thorough instruction, with frequent rehearsals, the playing and singing have both improved. Many of the encores were rollicking songs, the only fault to be found with which was their brevity. They kept the audience in a gale of good humor from start to finish. It seemed like a big family party.

The following is the program:

PART I.

Orchestra—War March of the Priests From Athalia . . . . . Mendelsohn

Chorus – Sing a Merry Song for the R. P. I. . Mrs Adams
Glee Club.

Solo and Chorus—Noah an' de Ark . . . . . .
Leo F. Dorn and Glee Club.

Solo and Chorus—Gypsy Love Song (from the Fortune Teller) . . . . . Herbert
Fred B. Lewis and Glee Club.

Morceau Pattietique—Cyancita Cristata . . . . . .

Solo and Chorus—Brown October Ale (from Robin Hood) . . . . . DeKoven
Ralph Blanchard and Glee Club.

Chorus—Soldier's Farewell . . . . . .

PART II.

Orchestra—La Czarine (Mazurka Russe) . . Louis Ganne

Chorus—The Chapel . . . . . Kreutzer

Hunting Chorus—What Shall He Have That Killed the Deer . . . . . Mrs. Adams
Cornets, Messrs. Eppert and Atherton.

Unison Chorus—Stein Song . . . . . Bullard

Plantation Melody—Swing Low, Sweet Chariot . . .
Herbert Shryer and Glee Club.

Intermezzo—The Poly Call . . . . . .
W. H. Hazard, George Benson and others.

Finale—Tinker's Chorus (from Robin Hood) . DeKoven
With Solo Quartette.

ROSE GLEE CLUB.

First Tenor—W. H. Hazard, '04, Carl Fischer, '03 Herbert Shryer, '05.

Second Tenor—N. Hadley Cox, '03, Irving J. Cox, '03, H. S. Kellogg, '03, Leo F. Dorn, '04, Ralph Blanchard, '05, Cleo B. Cook, '05.

First Bass—W. Heik, '05, Chas. R. Peddle, '05, George Crain, '04, George Benson, '05.

Second Bass—Gordon G. Brooks, '06, Chester L. Post, '03, Charles B. Trowbridge, '05, John F. Regan, Jr., '04, Fred B. Lewis, '05, Edgar Jones, '06.

ROSE ORCHESTRA.

First Violin—R. B. Hopkins, '06, J. E. Daily, '05, E. Canfield, '06.

Second Violin—Carl Wischmeyer, '06, L. F. Dorn, '04, H. Kiefer, '05, H. E. Wiedeman, '03.

Viola—W. H. Bowsher, '04.

Violincello—T. Marrow, '06.

Bass Violin—C. E. Scott, '92.

Trombone—H. Hammond, '07.

Flute—F. Foulton, '07.

Cornet—D. H. Atherton, '05, C. E. Eppert, '06.

First Clarinet—R. D. Landrum, '04.

Second Clarinet—R. W. Benbridge, '06.

Piano—C. Fischer, '03.

Drums—L. W. Klenk, '05.

Glee Club—Fred B. Lewis, president; Charles Peddle, secretary and treasurer.

Orchestra—Robert Landrum, president; Leo F. Dorn, secretary and treasurer.

SCIENTIFIC SOCIETY.

The Society met Saturday, Nov. 22, to hear Austin, '03, who gave an interesting talk on "Modern Illustration." The different processes of reproduction and the types of drawings best suited for half-tones, zinc etchings, etc., were

discussed. Sketches by famous illustrators were thrown on the screen as examples of what is best for various effects. The meeting was well attended and much interest shown. The Society will not meet again until after the vacation, when Michel, '03, will read a paper on "Rapid Transit Lines of New York City."

RESOLUTIONS.

WHEREAS, Our friend and fellow-classmate, Clarence A. Cohn, has suffered a great and irreparable loss in the death of his father, and it seems fit that we, the Class of Nineteen Hundred Three, do express in some way our sympathy; therefore, be it

Resolved, That the Class of Nineteen Hundred Three do take this means of extending to Mr, Cohn their profound sorrow and sympathy for him in his bereavement, and their sincere sorrow in losing him as a classmate. Furthermore, be it

Resolved, That a copy of these resolutions be sent to Mr. Cohn, and one to THE ROSE TECHNIC for publication.

A. A. KRIEGER.
C. L. CHAMBERLAIN.
H. C. GILBERT.
Committee.

Resolutions adopted by Student Body through Council:

WHEREAS, It has been the pleasure of Almighty God in His infinite wisdom, to take from our midst Raymond S. Archer, be it

Resolved, That we, the Student Body of Rose Polytechnic Institute, do extend to the relatives of the deceased, our heartfelt sympathy in their bereavement; and further be it

Resolved, That a copy of these resolutions be sent to the parents of the deceased, and to THE ROSE TECHNIC for publication.

H. S. KELLOGG.
ROBT. LANDRUM.
M. W. BLAIR.
Committee.

A SAD ACCIDENT.

On the night of November twentieth Mr. Raymond S. Archer of Pittsburgh, a member of the Freshman class, met a very sad death, about two miles west of Terre Haute, on the Big Four Railroad.

The presumption is that Mr. Archer had boarded a freight train to go to his former home at Paris, Ill., and in some way fell beneath the wheels.

Though Mr. Archer had been in our midst but a short time, he had many friends, and was greatly liked by all.

ALUMNI NOTES.

A. P. Stone, '99, spent Thanksgiving vacation with his relatives in Terre Haute.

Schwartz, '01, has been engaged recently in designing some electric hoists for his company.

The class of '98 will no doubt be glad to hear that Wiley is to start a class chain letter. It is each man's duty to do his best towards keeping this in constant circulation. This department of THE TECHNIC would be very glad to get some notes from it occasionally, so men of other classes can know what you are doing and where you are.

Chas. H. Jumper, '02, spent a day or two in this city about Thanksgiving time.

S. S. Roberts, '98, has recently been blessed with an addition to his family. It is Miss Roberts.

Bruce O. Tippy, '92, who is superintendent of the Detroit Gas Co., wants a Rose chemist to assist him.

Rumors to the effect that W. H. Insley, '00, is to be married within a month, are circulating around this vicinity. THE TECHNIC sends warmest congratulations.

S. E. Johannesen, '93, has resigned his position as Superintendent of the transformer department of the Wagner Electric Co., and is in the electrical department of the Westinghouse Electric and Manufacturing Co., of Pittsburg.

Arthur C. Eastwood, '98, is another Alumnus who has very recently been made happy by the arrival of a little girl.

Wabash, 0 — Rose, 0.

ON Nov. 15 occurred the best game of the season so far as our team is concerned. The team was in much better shape than in any previous game. It was, in fact, the only game of the year in which we played all of the best players which might have been chosen from among the students. The team that played had only a few evenings of practice together and the game they played was remarkable. It is safe to say that if the team that played Wabash on Nov. 15 had represented Rose throughout the season, there would have been a different story to tell, in some cases, at least.

Wabash kicked off to Bowie, who returned the ball 5 yards, Daily made 4 yards, and then Wabash held for downs. Bland immediately recovered the ball on a fumble. Bowie made 4, Bland 4, Kellogg 3, Brannon 3, Daily 8, and Kellogg 2 and 4 yards. Daily then took the ball around the left end and had dodged the last Wabash man, when he stumbled and fell, It was a pretty run and netted Rose 20 yards. Daily punted into the line, but Bland got the ball. Daily made 4 yards and Bowie another 4, after which the ball was lost on downs. Wabash then advanced 30 yards, where Rose held for downs. Rose could not gain and punted. Wabash then successfully attacked the Rose line and carried the ball to the three-yard line. Here they fumbled and lost a chance to score. Bland fell on the ball. Bowie made 3 yards and Daily made 3 and 2 yard gains. Daily punted and Kellogg got the ball. Daily punted again, and the half ended with the ball near the center of the field in Wabash's possession.

In the second half Rose kicked off to Wabash, who made a good return of the kick. In the first play Stahl tackled the man, forcing him back four yards. Wabash then attempted a punt, but Daily blocked the kick and caught the ball. Bland made 5 yards and Brannon another 5 and by shorter gains the ball was worked up to the 20 yard line. Here Wabash held and Bland tried a drop kick. The ball went wide of the goal.

Wabash punted from the 25-yard line. Brannon made 10 yards on the first play and then Daily punted. Wabash carried the ball rapidly up the field to Rose's 10-yard line. Here they again fumbled and Cox fell on the ball, Daily punted and Wabash, unable to gain, tried a place kick, which failed. Rose punted from the 25-yard line and regained the ball by holding for downs. There was an exchange of punts, which left the ball in possession of Wabash on Rose's 40 yard line, from which Marshall tried a place kick. The kick went sufficiently high, but the ball went just outside the goal posts. Daily punted from 25-yard line, and then Wabash,

with only a few minutes to play, began carrying the ball towards the goal. Marshall took the ball and ran 20 yards, being tackled by Kellogg within a foot of the goal line. In falling Marshall dropped the ball and it rolled over the line. Cox fell on it and another chance for scoring was lost. Rose punted from the 25-yard line and then held Wabash for downs. The game ended with the ball in Rose's possession near the center of the field.

Wabash put up a good game, but seemed to be playing in hard luck. Marshall, the big left half, was the star player for Wabash. For Rose, Bowie, Daily, Kellogg, Brannon and Bland were good at carrying the ball. Stahl and Cox put up a perfect defense against plays directed around the left end. Stahl played at left half on defense. Bowie was an important factor in the defense on the other side of the line.

Line-up:

ROSE.		WABASH
Speaker	C.	Van Nuys
Williams	R. G	Record
Krieger	L. G	Dice
Bowie and Ross	R. T	Livingstone
Brannon (Capt)	L. T	Wood
Stahl	R. E	Dague
Cox	L. E	Lynch (Capt)
Pine	Q.	Thornell
Kellogg	R. H	Reed
Daily	L. H	Marshall
Bland	F. B	Williams

Referee—Pike, of Indiana University.
Umpire—Bigwood, city.
Timers—Eller and Rumbly.
Linemen—Ristine and Fitzpatrick.
Time of Halves—30 and 25 minutes.

MARSHALL HIGH SCHOOL 0, ROSE SECOND TEAM 10.

After the game with Wabash the second team lined up for a game with the Marshall High School team. The game could not be called until almost dark on account of the other game and they were only able to play one 20-minute half.

Marshall kicked off and the second team, after losing and regaining the ball twice, pushed Mead over the line for a touch-down. Marshall again kicked off and Rose, in a short time, had pushed Hopkins over for a second touch-down. Kiely missed both goals.

McNabb, Streeter, Hopkins and Mead did the best playing for Rose.

Line-up:

ROSE.		MARSHALL
Smith	C.	Pritchard
Cook	R.G	Friedenburger
Hopkins	L.G	Gagin
Miller	L.T	English
Mead	R.T	Claypool
Warren	L.E	Brown
Mullett	R.E	Privoe
Kiely	Q.	Welsh
Reynolds	R.H	Taylor
McNabb	L.H	Tange
Streeter	F.B	Garver

Referee—Crawford.
Umpire—Taylor.
Touch-downs—Mead and Hopkins.

EARLHAM 32, ROSE 0.

There was no game on the Campus Nov. 22. The second team played at Marshall and the first team was idle on account of the refusal of the University of Indianapolis to play its game, scheduled for that date.

After the Wabash game several of the players withdrew from the team. Practice stopped almost completely and it was a badly disorganized team that represented Rose at Richmond on Thanksgiving day. Bowie, Pine, Kellogg and Eppert were not in the game. Cox was put in at quarter, and Streeter, McBride, Oglesby and Reynolds filled the other vacancies caused by the withdrawal of the regular men.

The day was cold and the game was played on a field that was partly covered with water and completely covered with mud. Earlham kicked off and secured the ball on a fumble. They then pushed over for their first touchdown in about two minutes of play. They made two more touchdowns in the first half and had a score of 16 to 0.

Earlham continued strong in the second half, keeping the ball most of the time. They fumbled some, but quickly regained the ball on fumbles or downs. They scored three more touchdowns in the second half, making the final score 32 to 0.

The game was a good-natured one and was regarded more as a joke than otherwise. Earlham played a hard and a fast game, considering the

condition of the grounds. Rose was on defensive most of the time, hence the defensive men were the only ones who distinguished themselves. McBride and Cox did the best playing. Williams was the only Rose man who could gain when given the ball.

The line-up:

EARLHAM.		ROSE
Leggett	L. E	McBride
Hobbs	L. T	Brannon (Capt)
C. Macy	L. G	Krieger
Allee	C.	Speaker
E. Macy	R. G	Streeter
A. Macy	R. T	Williams
Stanley	R. E	Oglesby
Ratcliffe	Q.	Cox
Bond	L. H	Daily
Binford	R. H	Stahl and Reynolds
Clark	F. B	Bland

Referee—Riggs.
Umpire—Sackett.
Time of Halves—25 and 20 minutes.

MARSHALL HIGH SCHOOL 0, ROSE SECOND TEAM 23.

The second team played Marshall a second game on Nov. 22, at Marshall, defeating them by a score of 23 to 0. The game was played on grounds partly covered with water.

Kiely won the toss and took the north goal. Welsh kicked off for Marshall to Mead, who returned 25 yards. Then, after a few line bucks, Streeter carried the ball for 40 yards and a touch down. Kiely kicked goal.

Welsh kicked off again and Rose returned in a few plays to the 30 yard line, where the ball was lost on a fumble. It was regained again in the center of the field by McNabb, who made a touch down. The crowd interferred and the ball was brought back and the half ended with the ball in the center of the field.

Marshall put in two new men in the second half and Stahl went in for Rose. Rose carried the ball to the 35 yard line, where Kiely made a place kick. Mead and Warren each made touch downs on long end runs. This brought the score up to 23. At one time Kiely ran the entire length of the field for another touch down, but the crowd again interfered, and the ball was brought back.

Miller did the best work for Rose, and Welsh for Marshall, until he was forced to retire from the game with a broken collarbone.

Line-up:

MARSHALL.		ROSE
Prevoe	R. E	Mullett and Stahl
English	R. T	Miller
Baird	R. G	Cook
Pritchard	C.	Wilms
Gagen	L. G	Hopkins
Clark	L. T	Mead
Friedenberger	L. E	Warren
Welsh and Gorman	Q. B	Kiely (Capt)
Logan (Capt)	R. H	Reynolds
Taylor	L. H	McNabb
Garver	F. B	Steeter

Referee, Bland.
Umpire, Taylor.
Timers—Crawford and Steel.
Score—Rose 23, Marshall 0.
Time of Halves—25 minutes.

"A LITTLE NONSENSE, NOW AND THEN,
IS RELISHED BY THE BEST OF MEN."

Christmas with its feasting is now again at hand;
The shouts of happy children are heard throughout the land.
The shouts of those that revel, and the songs of those that sing,
All join in one grand unison and a merry Christmas bring.

The Christmas spirit is abroad, and spreading far and near
It touches nearly every heart, and dries up many a tear.
And those who fail to welcome it, and give it room to grow,
Will miss the best chance for doing good that mortals ever know.

And those examinations that cause us all to shrink,
Won't seem so bad as they often do, if we only stop to think,
If we get a thing worth having we have to pay the fine.
Then think of that two weeks' vacation at the jolly, old Christmas time.

A Freshman, with a cold in his head, was serenading a lady friend as follows:

Cub, O! cub with be,
The bood is gleabig.

He got this far, when the father of his lady love, opening the window, shouted:

"Why dod't you blow your dard dose?"

If the majority goes against you, don't get mad, but be a man and fall in line.

Hath—It seems that anyone with the average amount of intelligence should know that by this time. (Poor old Juniors, how's Calculus?)

BANQUET ECHOES.

Prof. Hathaway (next morning)—Which side of this line is the point?

Klenk—How many lines are there, professor?

Jenckes—Ach, mein Kopf.

MacBride—It beats all. I played poker two hours and couldn't beat a pair of kings, but I had a flush before I'd been at the table half an hour.

If a man can say clearly, "Say, should such a shapely sash such shabby stitches show," then he is perfectly sober, regardless of looks. For appearances are sadly deceitful.

Last night I got full of beer, and this morning I'm a sad Budweiser (but wiser) man.

Falley—Wo ist mein Hut gegangen?

The best thing that can happen to a kicker is to be kicked out.

Prof. Wickersham—Mr. Leedy, you don't pronounce your German properly.

Leedy—You see, professor, I've been speaking French all summer.

Wicky—Well, from your pronunciation, it might have been Yeddish.

Say, Palmer, what are you going to do Thanksgiving?

Palmer—Eat.

Then what?

P.—Eat some more.

It was Thanksgiving night and three or four Poly students, whose spirits had risen in proportion to the lowering of their center of gravity by the many good things incident to Thanksgiving, had lingered at the boarding house after supper. One of the number, who is conceded to be somewhat of a comedian, had been amusing the company by waiting on the family.

One of the young ladies asked for a cup of coffee. Soon the "waiter" appeared with a cup delicately poised upon the tips of his fingers in a manner that would have done credit to a waiter at the Waldorf-Astoria. With a few flourishes he lowered the cup to the table, when there came into view an egg floating in the coffee.

"There is nothing like egg to settle coffee," gravely remarked the "waiter."

It is needless to say that this settled the rest of the meal, as well as the coffee, for the young lady.

AN OLD ANTHEM.

(A corruption.)

Christmas is coming so merry and gay.
Nature is mantled in white.
Polys are eagerly working all day.
Plugging from morning till night.
Thousands of students are grinding away,
With steady, unceasing toil,
Paying for fun at the first of the term
By burning the mid-night oil.

"Christmas play and have good cheer
For Christmas comes but once a year."

Trowbridge (in Analytics)—Here is where I draw the line.

He sent his boy to college,
And now he cries, Alack!
He spent ten thousand dollars
And got a quarter back. —[*Puck.*

During the approaching holidays many an engineering student will doubtless appreciate and be able to demonstrate, as he stands with his sweetheart beneath the circle of mistletoe that dangles from the chandelier, that the parallel projection of a circle is *a lip tickle.*

During the past month we have noted the appearance of a photograph of the football team. Every man wears an amiable expression and to look at the photo you would never guess that luck had not favored them during the season just past. We are glad to see that Professor Hathaway stands with the team in the picture, as he has stood by them during their daily practice. He has always shown that he was interested in the success of the team and encouraged the boys to "stick to it" when things didn't go our way.

The Juniors will now be very careful when they try to play a joke on Prof. Hathaway. Some few weeks ago, at the end of a recitation, one member handed the professor a "Liar's License," which stated in eloquent words that Professor Hathaway was authorized to "extraordinarily stretch the truth." When the professor looked over the paper, he immediately said: "Oh! I see you have presented me with a certificate of membership to the class of 1904." The Juniors looked at each other foolishly and decided that the laugh was on them.

THOSE POOR FRESHMEN.

The Freshman seemed a trifle sad, a tear was in his eye.
I looked at him in sympathy, and begged him tell me why.
"Alas! Alas," the Freshman said, in a voice that shook with woe,
"I've just now read the catalogue, it does distress me so;
It says that sixty are allowed in the Freshman class to stay.
If I should flunk, oh me, oh my, I'll have to go away."

Never let your studies interfere with your college education.—[*Ex.*

The ball having been punted out of the boundaries of the field, Kiefer, '03, quickly ran after it and gracefully kicked it back to the players. A young lady on the side line watched the experienced way he handled and kicked the ball, and then, in a musical voice, exclaimed: "Well, Mr. Kiefer, why don't you get on the team?"

AN IDIOTIC DIGRESSION.

There once was a Freshman and he plugged real hard,
With Math he wrestled, with Dutch he sparred;
For Quizzes were coming, both thick and hard;
And ever his query—passed or barred?

There once was a Freshman—a jolly green Freshman,
And he was a sight to see;
He plugged so hard,
And he thought—oh, Lord—
If I pass—how glad I'll be.

There once was a Sophomore with knowledge soaked,
On a perfumed cig. he puffed and smoked,
And whatever he did he always joked,
For he knew in exams. he'd not get soaked.

There once was a Sophomore, a very fresh Sophomore,
And he was a sight to see.
He tried on the level
To be a real devil,
It's a pity it could not be.

There once was a Junior, ne'er a man better,
His trousers were baggy, his shirt was a sweater;
It's coin that he wanted when he sent home a letter.
Said he to another, "Say, Bill, have you met her?"

There once was a Junior, a very wise Junior,
And he was a sight to see,
He cut his classes
To visit the lassies,
For 'twas ever "Come play with me."

There once was a Senior, and what do you think?
He could tell you anything, quick as a wink.
Why does the sun at the day's end sink?
And how many tacks in a bottle of ink?

There once was a Senior, a very grave Senior,
And he was a sight to see.
The weight of a stamp;
The width of a lamp
And what makes the jump of a flea.

—'04.

A CURE FOR BLUES.

The short days approach when the young turk hideth his head and regardeth the farmer with a suspicious eye. In the same way doth the weary Poly cast a side glance at ye jovial prof. Now is the pipe-line strengthened. As the critical day approacheth the knees do smite each other. But as the vision of the family board, groaning under ye slaughtered turk, cranberries and mince pie, doth appear in the mind of the abused Poly, then do all troubles vanish, and a rainbow smile settles upon his hitherto dejected countenance. And as a picture of that blue-eyed Elsie cometh up before him, verily he doth smile more and more until his pearly tusks push their way through his crimson lips and his whole frame shaketh with laughter. In sooth it is a goodly cure for blues. And as the blues do now beset us all 'tis meet that we should summon up such visions. Then will exams be easy.

Well, we ought to see some pretty fine basket ball games this year. The way that Junior challenge was accepted by all parties was a caution. It just goes to show that interest runs high. Yes, even the class of '07 accepted the challenge. It is reported that the Juniors expect the Faculty to accept it also. If they do the Juniors will have to work overtime learning the fine points of the game.

Professor—Supposing I would give you this question in Mechanics for examina--

Regan (interrupting)--We'd flunk.

Boarding House Waitress—Have some more meat?

Astonished Poly—Do my ears believe me! Yes!

Wicky—Ne savez-vous pas?

Bryon—I don't savey that.

Hath—The graph of velocity is called the hodograph.

Mullett—What's the phonograph the graph of, professor?

Dr. Mees (meeting Staff Sunday noon)—I suppose you just got up?

Staff—Just got up! Why, Doctor, I haven't gone to bed yet.

Goodman (in an apple orchard during civil work)—Come over quick, fellows, we can pick enough apples to sell.

Perhaps you noticed that new piece of apparatus in the physical lecture room. It is to illustrate wave vibrations, but from the following bill which was found in the room it is evident that someone took it for a ladder.

HIGH DIVE.

See Monsieur Bryon do his great feat of diving from a platform at the top of the physical lecture room. He will begin to climb the ladder at three o'clock and at four-thirty will dive upon a non-isotropic substance and will be reflected back in a horizontal direction, constantly emitting rays of polarized light parallel to the line of flight.

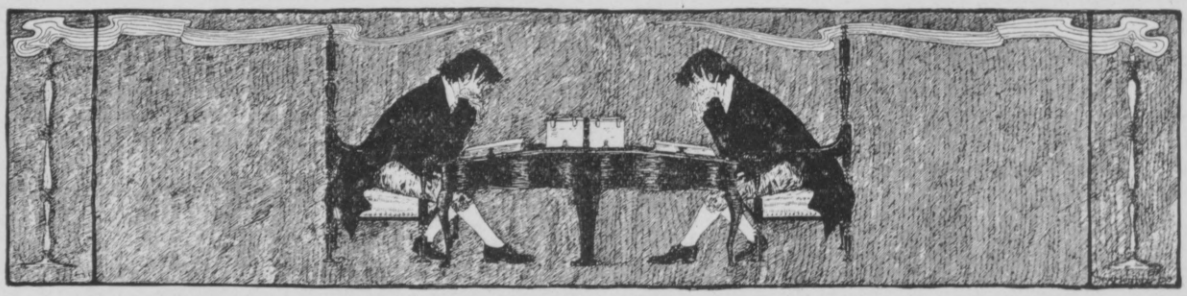
Jojo—Suppose we have a metre stick eight inches long.

You have probably noticed those TECHNIC boxes distributed over the school. There is one in the shop, one in the physical laboratory, and another in the library. For the past few years they have not been used, probably because the keys were lost. But we have now procured a key and so they will hereafter be opened once a month. If you know, hear, see, or learn of anything which you think will interest us, just drop it in one of these boxes and we will do the rest. In the library we found a few jokes or puns which were so old that the ink was beginning to fade. Below are a few of them. The Alumni will probably enjoy one or two of them more than the rest of us will:

Marshall (in civil)—Is that scale 6,000 feet to the panel?

Schroeder, alias Brown, says that the cops of Terre Haute can't run a little bit. (Oh! what tender memories this brings back!)

It is reported that Pine is getting very fond of his "dolls," so much so, that he especially delights in shoveling snow off their sidewalk.



REVIEWS

Mechanics Problems, by Frank B. Sanborn. Published by the Engineering News Publishing Co. 8x5½ inches; 140 pages. $1.

This book, written by Prof. Sanborn of Tuft's College, would be, as the author intended, especially valuable to engineering students. It contains five hundred examples, many of which were met with in actual engineering practice. The problems extend over the entire field of Work, Force and Motion, and they tend to emphasize many points in the subject of mechanics, which are often missed when the student follows a text only.

It contains several full page half tones, besides many diagrams illustrating the problems, an alphabetical index and answers to examples. In every way this book would be an aid to the student.

J. B. H.

COMPLETE COMBUSTION OF FUEL.

THE theory that for complete combustion of fuel, there must be introduced a sufficient supply of oxygen, while the gases are at the temperature of their kindling points, seems to be neglected in the practical construction of boilers. The "smoke nuisances" of every bituminous coal burning town are ample proof. The following is taken from the *Engineering Magazine:*

While indeed there are certain fuels which show smokeless combustion, such as charcoal, coke, and anthracite, these too demand proper conditions in order that the full thermal efficiency may be obtained from them, so that the whole question of the proper combustion of fuel for steam making can be reduced to certain fundamental principles.

Although these principles have been known for a long time, and their demonstration is included in every elementary course in physics, we see them almost totally ignored in engineering practice. In locomotives we find the combustion carried on in a contracted box in which five of the six walls are formed with water spaces, usually miscalled heating surface, but more properly entitled cooling surface. In the type of marine boiler in general use the fires are maintained in small cylindrical furnaces, than which nothing more effective for chilling the fire could well be devised. Water-tube boilers are nearly always set with the tubes directly over the fire, while the horizontal tubular boiler, so extensively used in the United States, is also set directly above the grate.

The immence infiuence which these constructions have upon the combustion of the coal will be seen when it is understood that the igniting temperature of bituminous coal is between 700 and 800 degrees F., while the temperature of the water in the boiler, and hence of the metallic surfaces close to the fire, is not more than one-half as much, and therefore complete combustion cannot be expected.

The idea of the practical man is that all this can be remedied by the admission of an excess of air, since he assumes that the presence of oxygen will suffice to make up for lack of temperature. In this he forgets that the finely divided particles of unburned carbon which constitute smoke cannot be so readily disposed of. The particles of carbon are really floating in an atmosphere of nitrogen and of carbonic acid, and in most cases the excess of air admitted never reaches the combustible at all, but serves only to dilute the whole, absorbing heat and passing out of the chimney unused.

The remedy for this state of affairs is obvious, so much so that many overlook it altogether. If the furnace be removed altogether from its close proximity to the cooling surfaces of the boiler, and be surrounded by walls capable of being raised to a temperature higher than the critical igniting point of the fuel, there will be no difficulty in burning all the combustible constituents of the fuel, provided sufficient oxygen be supplied. In other words there should be a separate furnace of ample size constructed, conveniently placed in front of the boiler,

and containing only the grate, and including walls of firebrick capable of being maintained at a high temperature. The throat of the furnace can communicate directly with the flues or other heating surface of the boiler, and the intensely hot products of the already completed combustion thus delivered where they will do the most good without the possibility of producing smoke.

INSTRUCTION IN RAILWAY SIGNALING.

The Massachusetts Institute of Technology is the first school to introduce a course of instruction in practical railroad signaling. As a thorough knowledge of automatic block signaling and interlocking systems is now almost necessary to the engineer entering railroad work, it seems that this course should prove to be quite successful. The following is an extract from an article in the *Railroad Gazette:*

These lectures are practical lessons in the theory and principles of railroad signaling according to the best practice, and are so comprehensive in their scope that they cover the ground thoroughly enough to give those who take the course a good working knowledge of the principles of the subject, so that, with a sufficient study of details, they will be competent to lay out and superintend the installation of systems of signaling, not too complicated, in either manual controlled, manual, or automatic block signaling, or interlocking, with the certainty that it will conform to good standard practice.

Through the generosity of the different manufacturing companies and the liberal policy of the Institute itself, these lectures are illustrated by full sized working models of signaling devices, and these are in working condition in connection with three narrow gauge tracks, on which miniature trains are run, performing the same operations on the model signals which would actually take place on a standard railroad with an actual train. There is also a collection of nearly 100 lantern slides which are constantly being added to, and a number of large photographs taken from installations of block and interlocking signals in use on leading American railroads, which illustrate the lecturer's statements.

The instruction in the lecture and model rooms is supplemented by excursions to points, within accessible distances of Boston, where a variety of applications of signal apparatus can be seen in regular operation. With these the student becomes familiar not only with the theoretical principles of the subject, but with many working conditions. There are in and near Boston several up-to-date installations of mechanical and electro-pneumatic interlocking and of controlled manual and automatic block signaling, and the managers of the different railroads are very courteous in giving facilities for inspection and study of their plants. The student therefore has opportunity to handle the instruments himself and observe their working under normal and abnormal conditions.

METRIC SYSTEM IN GREAT BRITAIN.

There has been lately quite a discussion as to the advisability of the universal adoption of the metric system. Although, as yet, this discussion has resulted in nothing definite in this country, its cause seems to be gaining support in England, as the following article from the *Electrical World and Engineer* would indicate:

Consul-General H. Clay Evans sends from London, August 30, 1902, a letter from the secretary of the Decimal Association, showing the progress of efforts to have the metric system of weights and measures adopted in England. The letter says:

"It has come to my knowledge that there is a considerable feeling in favor of the adoption of the metric weights and measures in the United States of America, and with this in mind, I am sure you will be interested in information regarding the prospect of this country adopting metric weights and measures also. I therefore venture to lay before you the following information:

"There are 290 members of the present House of Commons so thoroughly in accord with our aims that they have given me authority to publish their names as supporters. If we add to this the number of members of Parliament who would be influenced by a debate in the House of Commons to vote in our favor, we are convinced that we are now strong enough to carry a bill. During the last four or five weeks, no less than 60 city, town and county councils have passed resolutions to the effect that it is desirable that the reform should be made in the interest of commerce and education.

"One of the most definite results, in fact, I think I must say, the most definite result, of the conference of the colonial premiers was the passing of a resolution in favor of the adoption of the metric weights and measures throughout the British Empire. This will have a most important result, and will render certain the early passing of a bill to give effect to those views. All the chambers of commerce in this country, nearly all the school boards, the trades unions, and a great number of societies of various kinds have for a long time been active supporters of my association.

"The attitude of our Premier may be gathered from some remarks he made to the deputation, which waited upon him in regard to this question in 1895. He said: 'If I may express my own opinion upon the merits of the case, there can be no doubt whatever that the judgment of the whole civilized world, not excluding the countries which still adhere to the antiquated systems under which we suffer, has long decided that the metric system is the only rational system.'"